09/781,891

39 FIGS

Figure 1

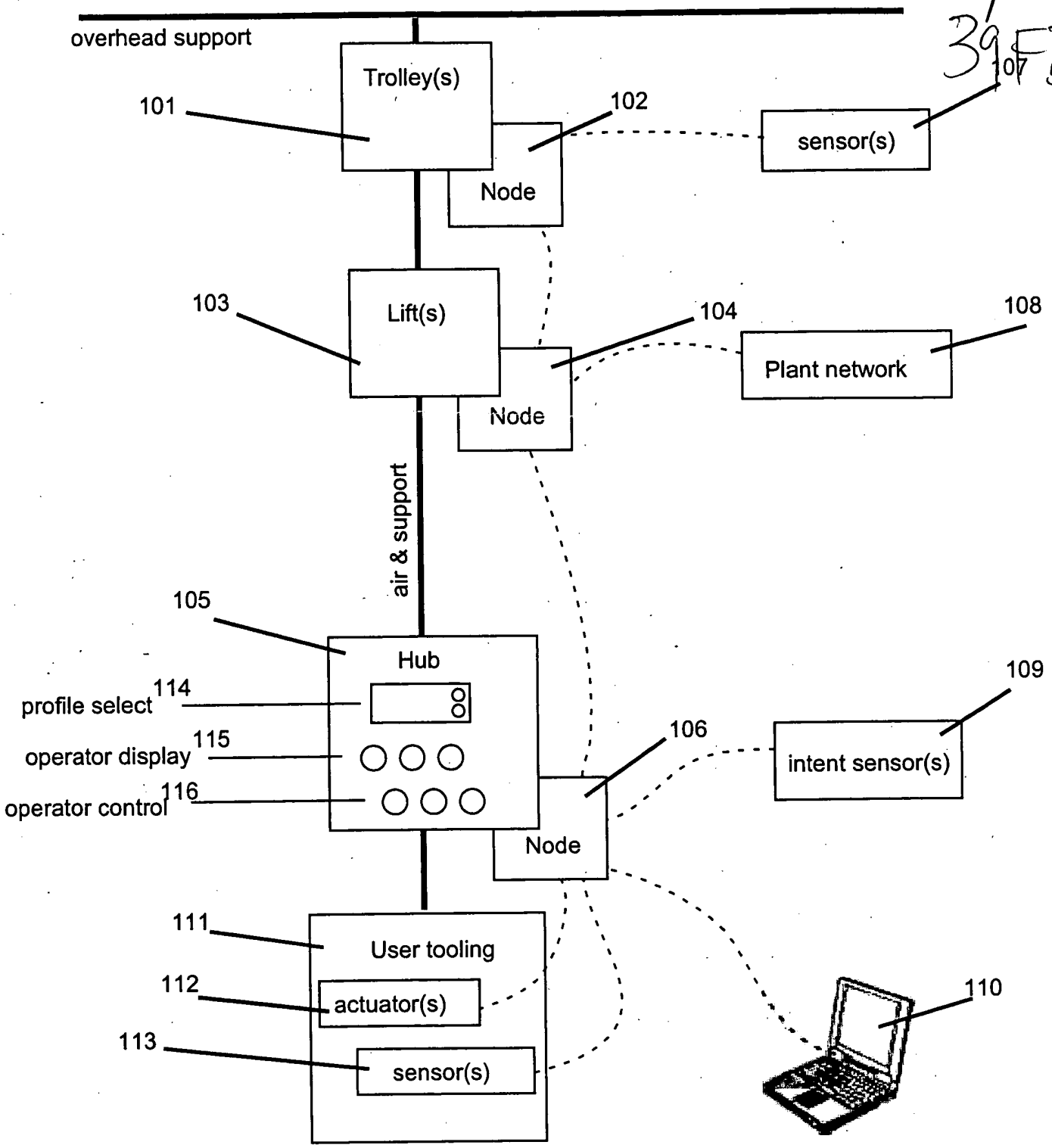

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Figure 2

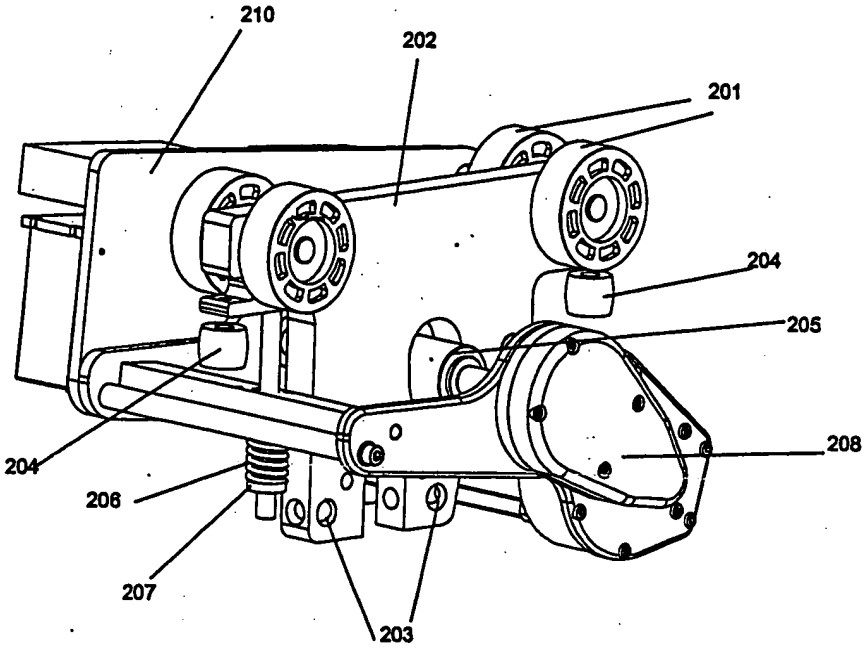


Figure 3

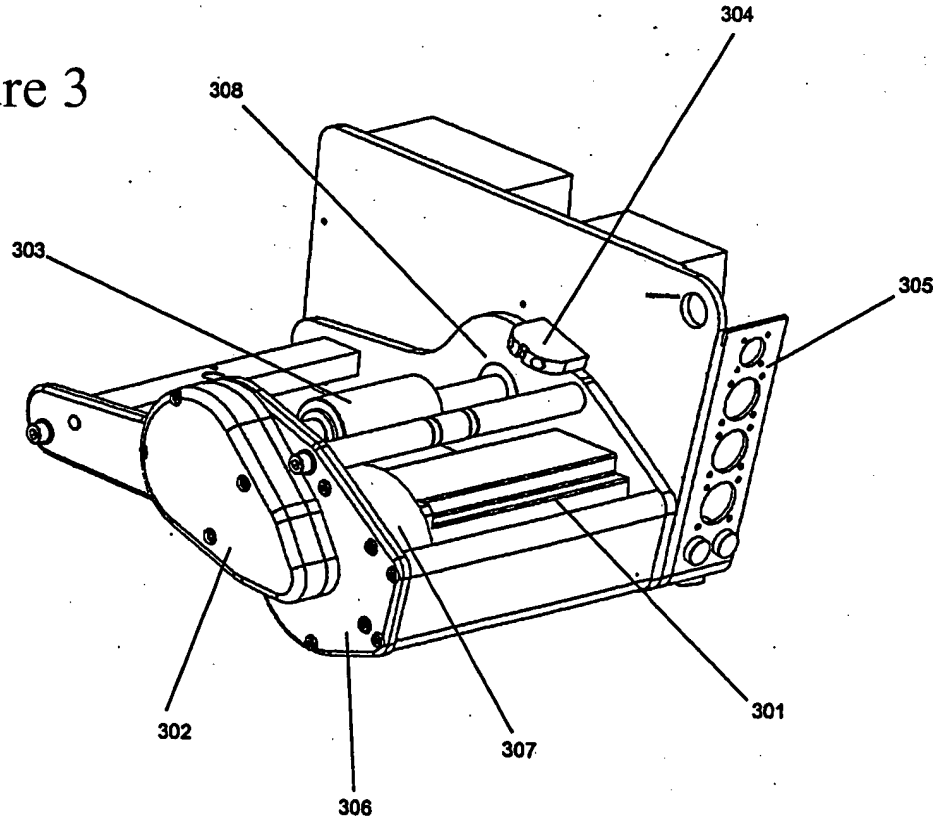


Figure 4

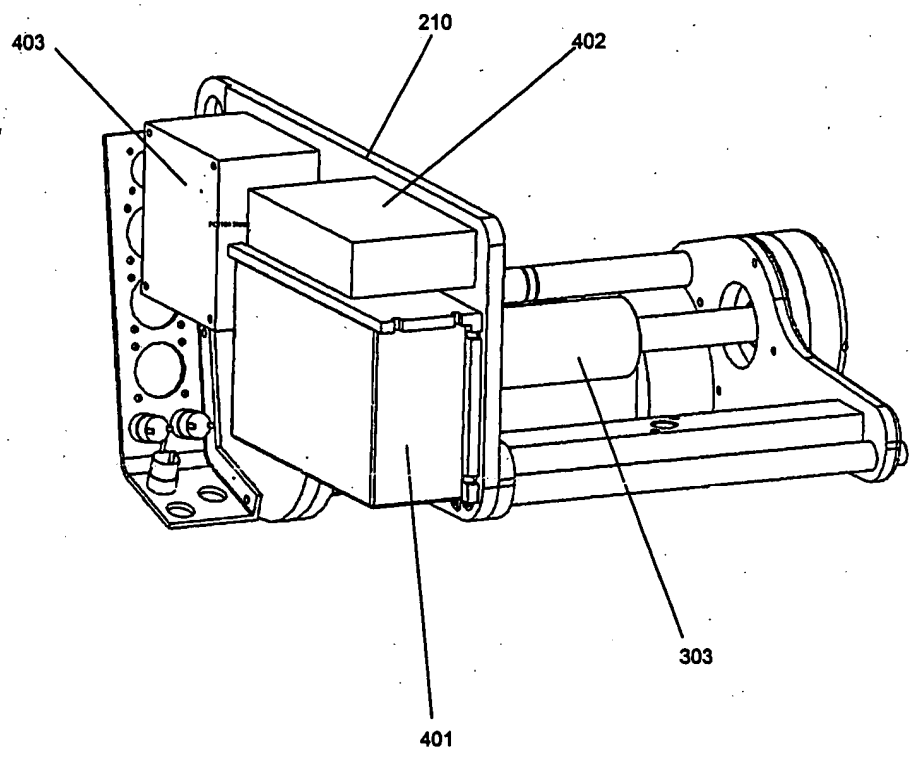


Figure 5

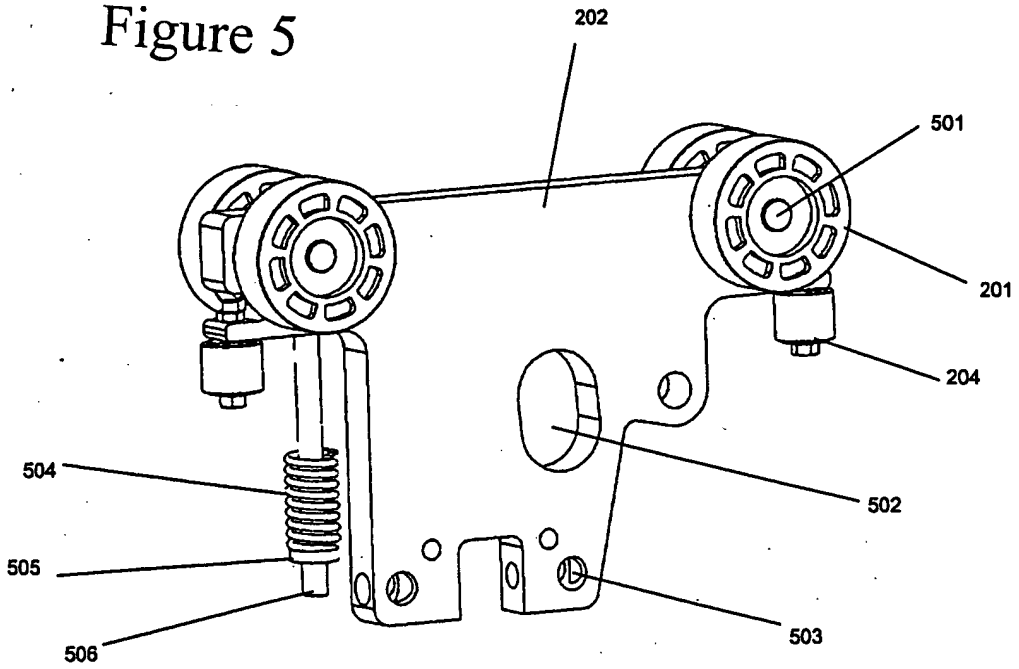


Figure 6

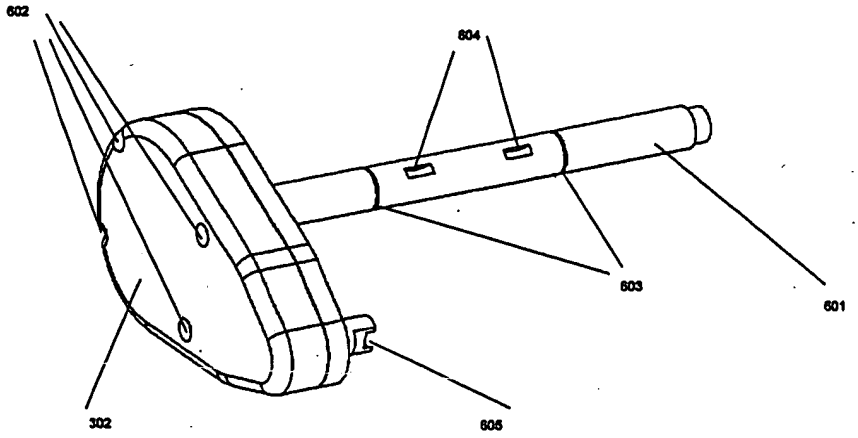


Figure 7

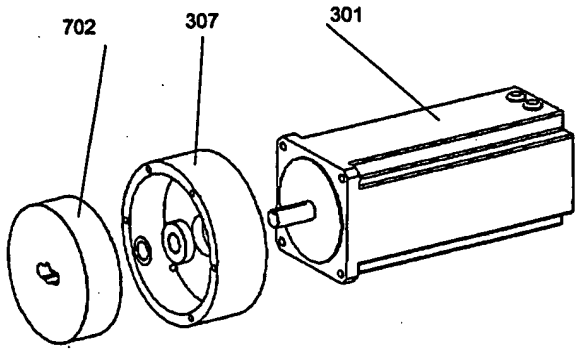


Figure 8

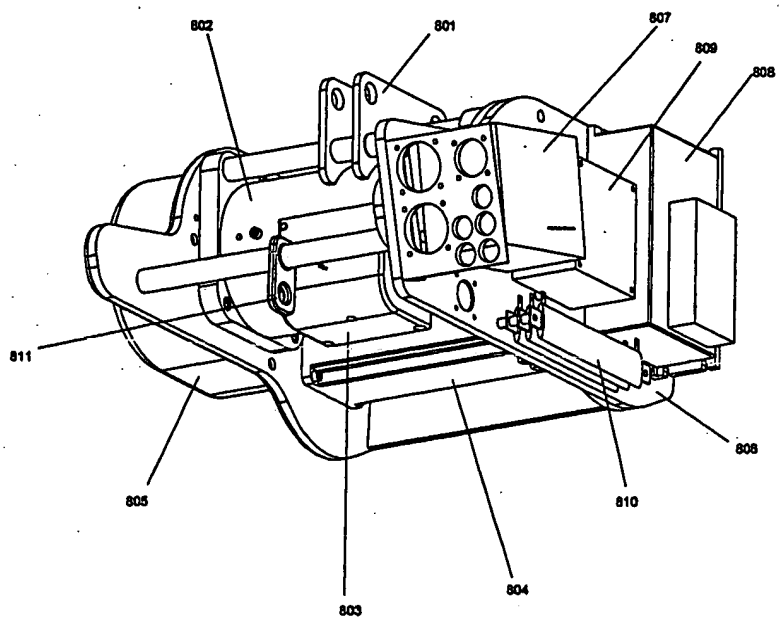


Figure 9

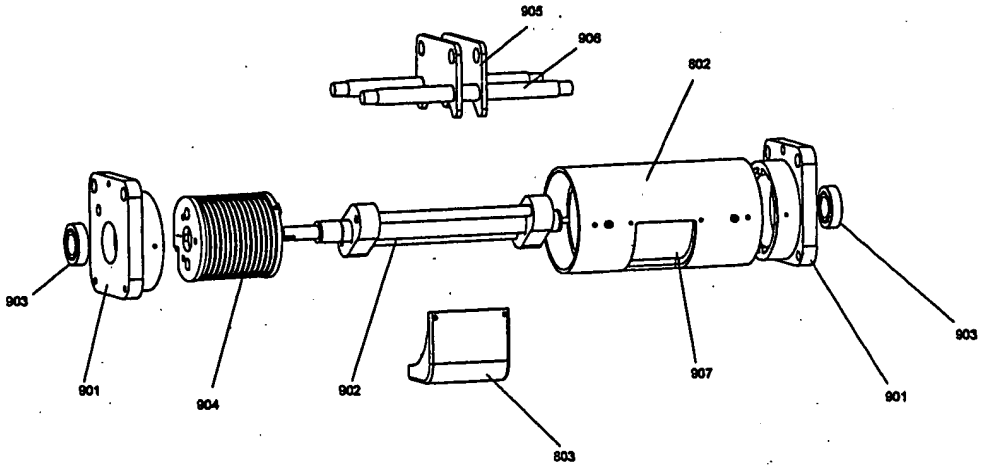


Figure 10

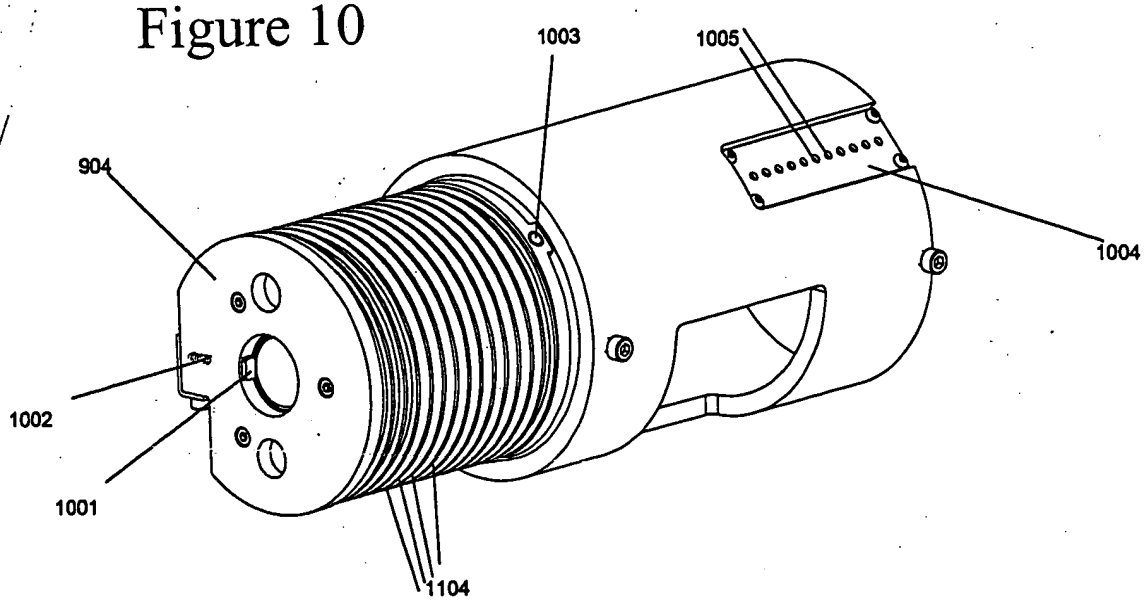


Figure 11

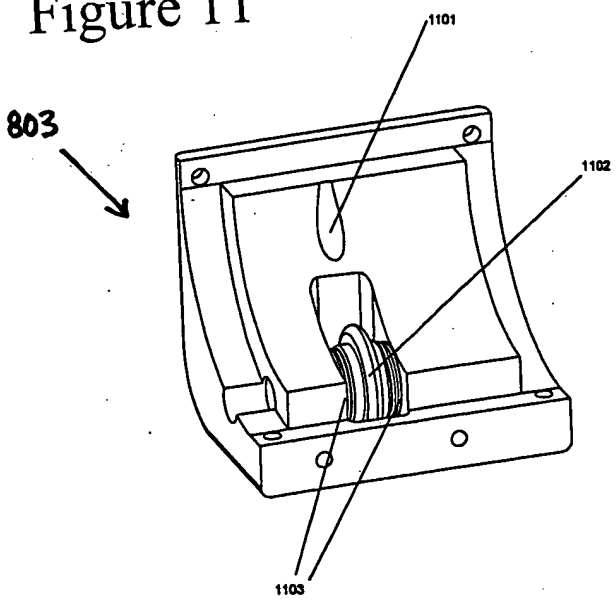


Figure 12

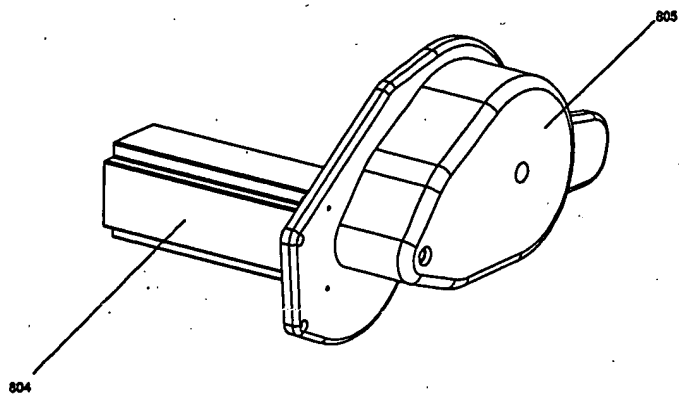


Figure 13

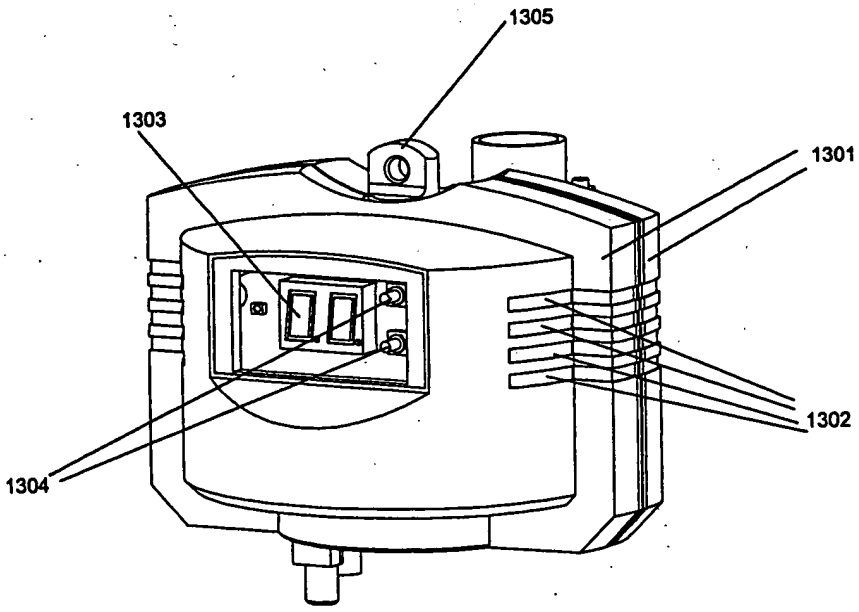


Figure 14

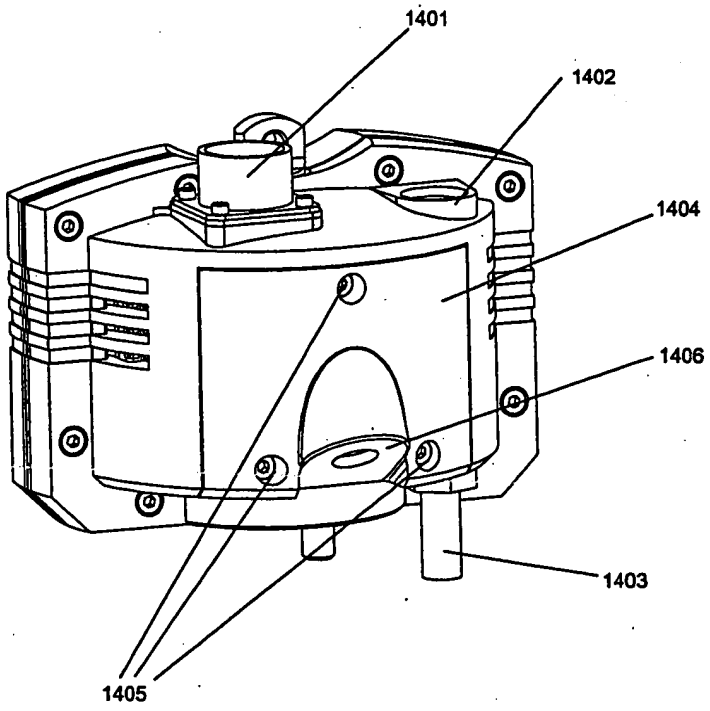


Figure 15

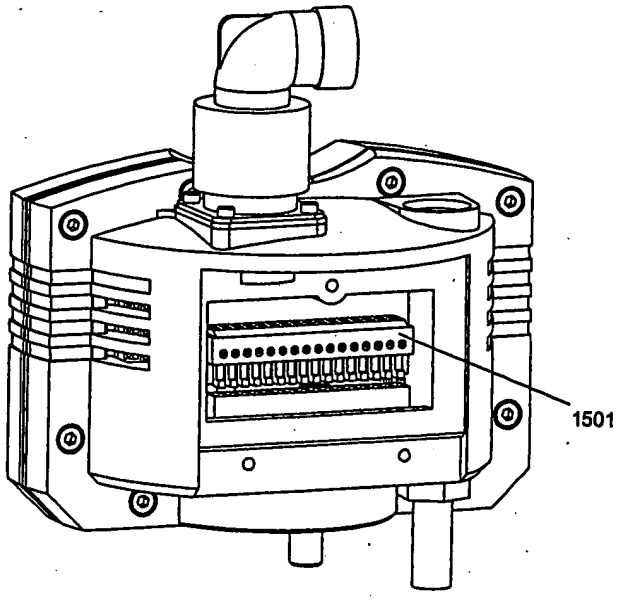


Figure 16

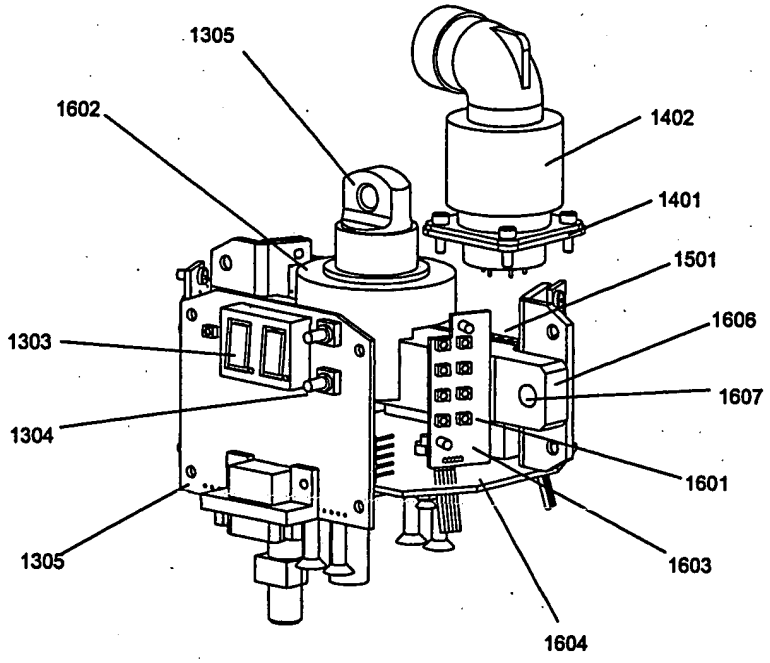


Figure 17

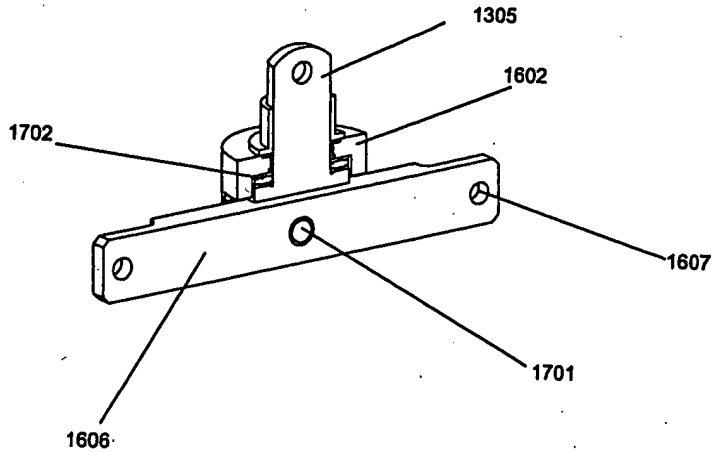


Figure 18

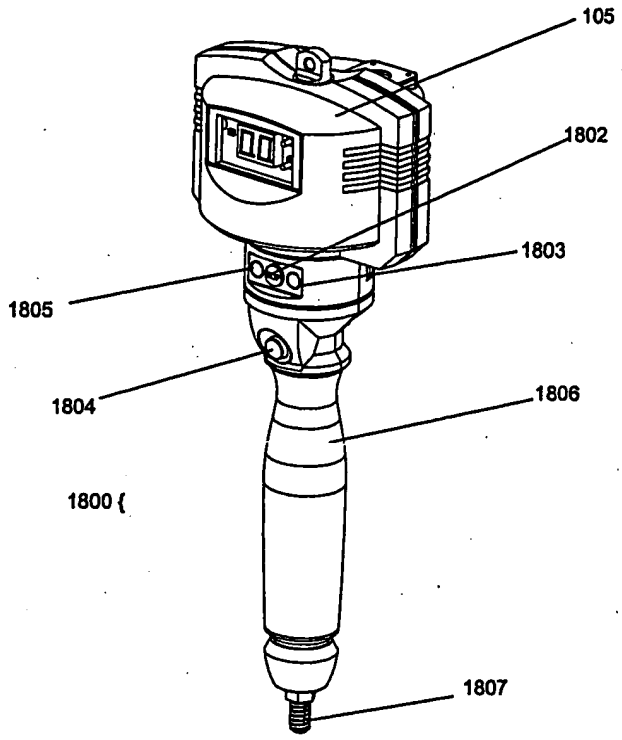


Figure 19

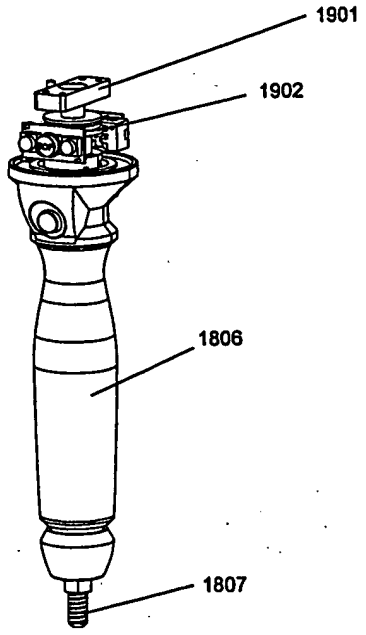


FIGURE 20a

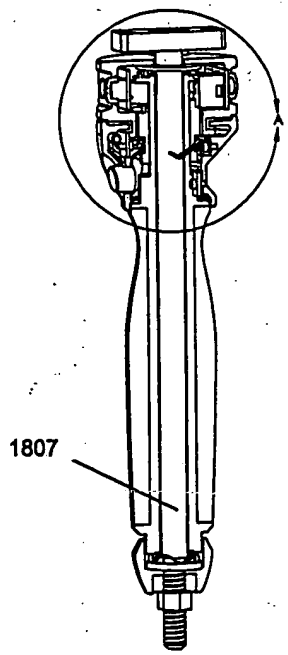


FIGURE 20b

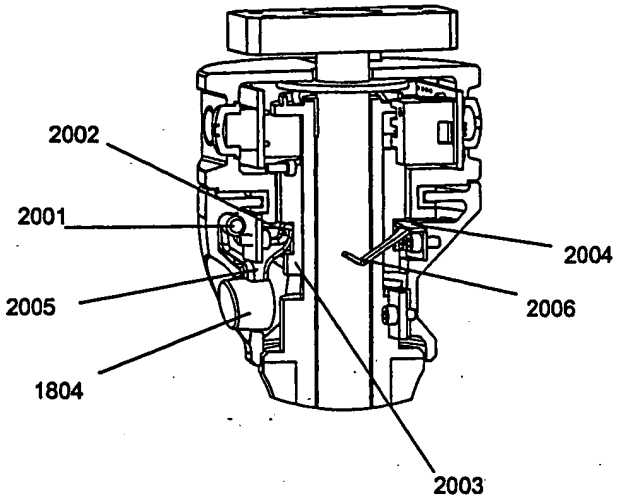


Figure 21

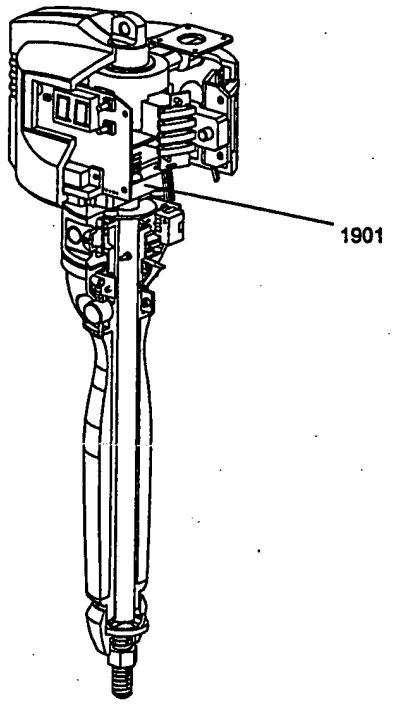


Figure 22

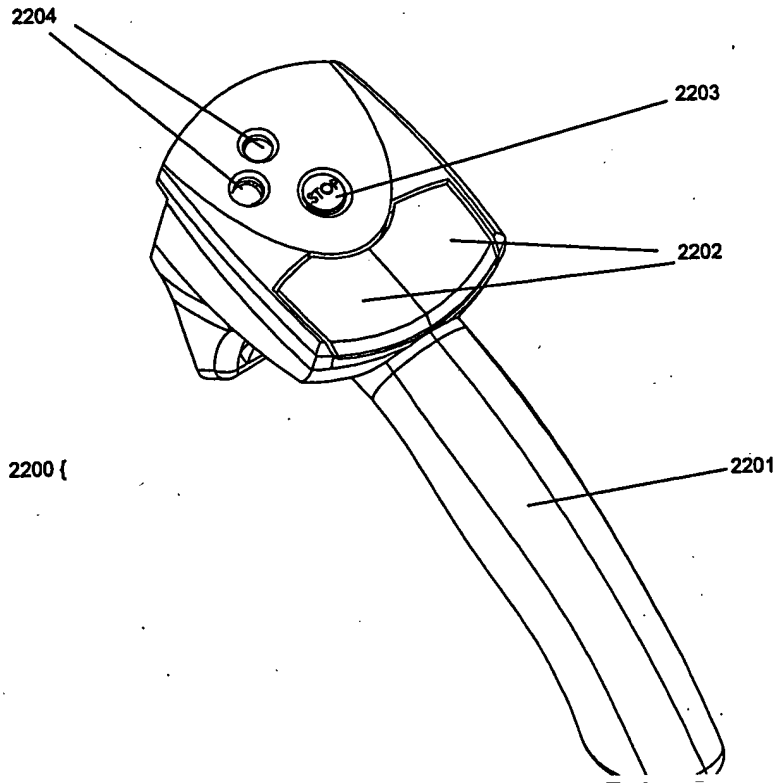
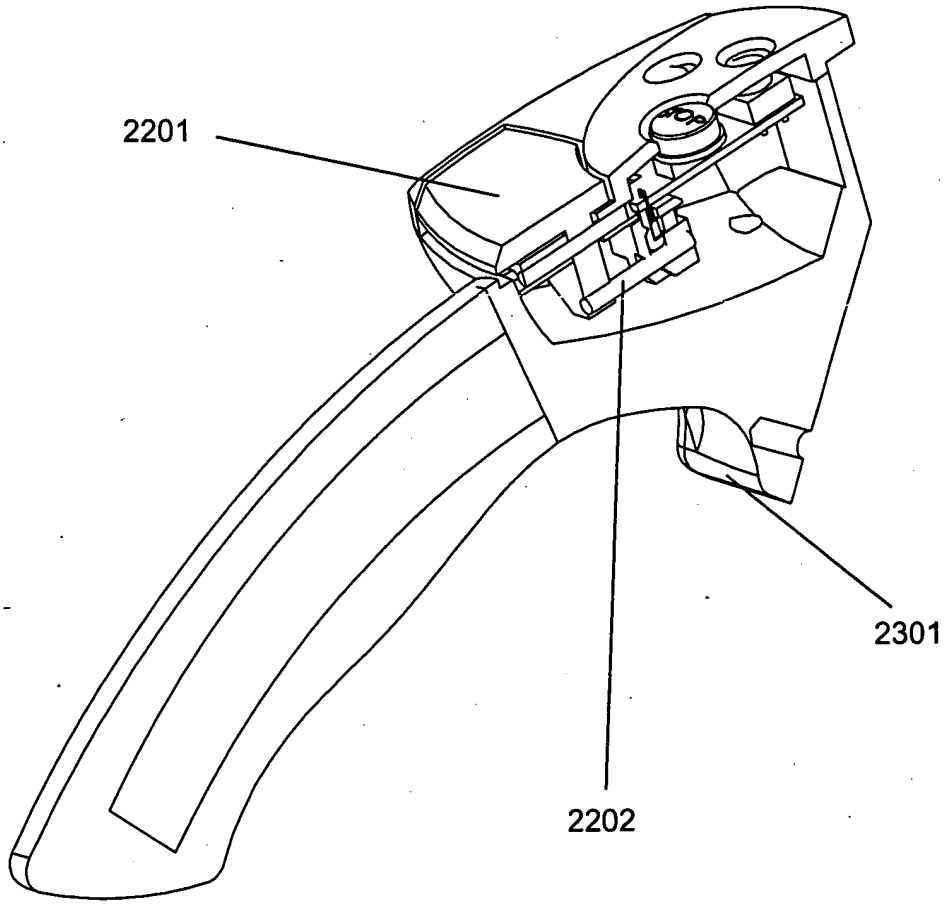


Figure 23



4,908,963

Figure 24

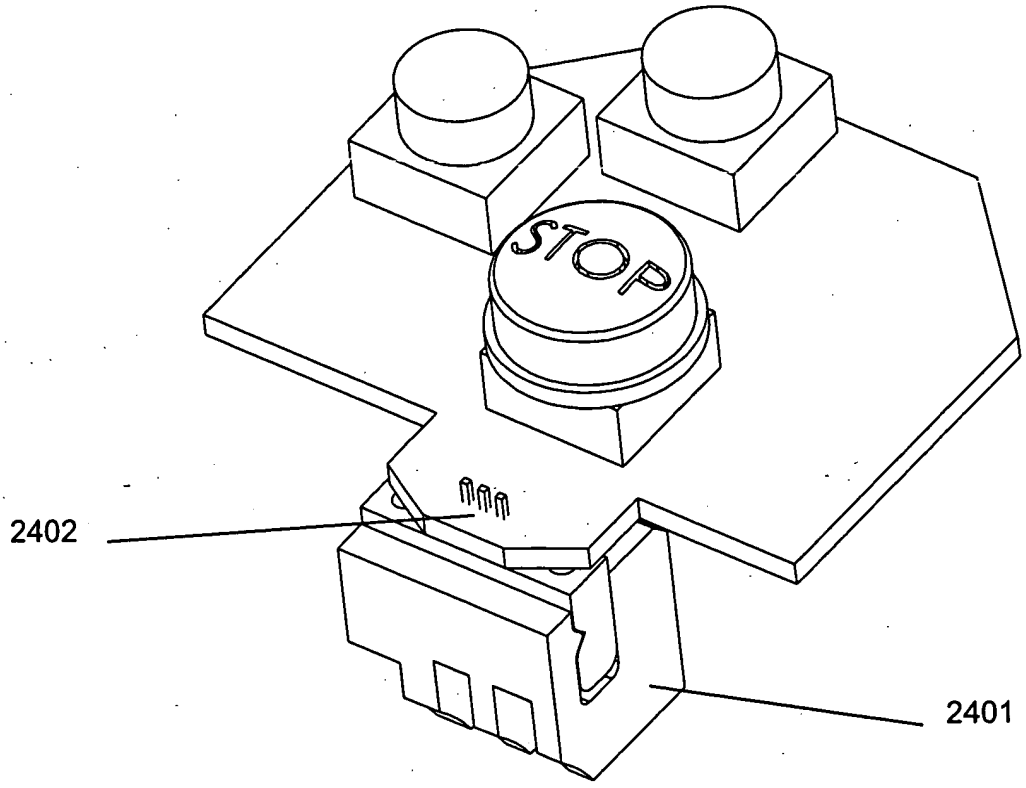


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Figure 25

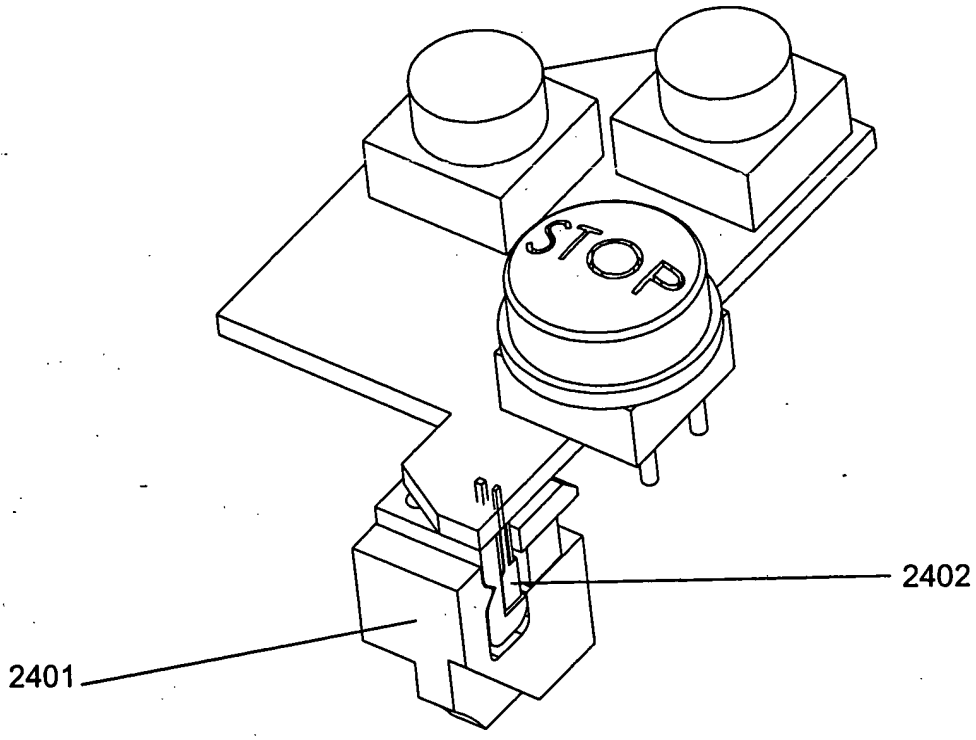

Figure 26

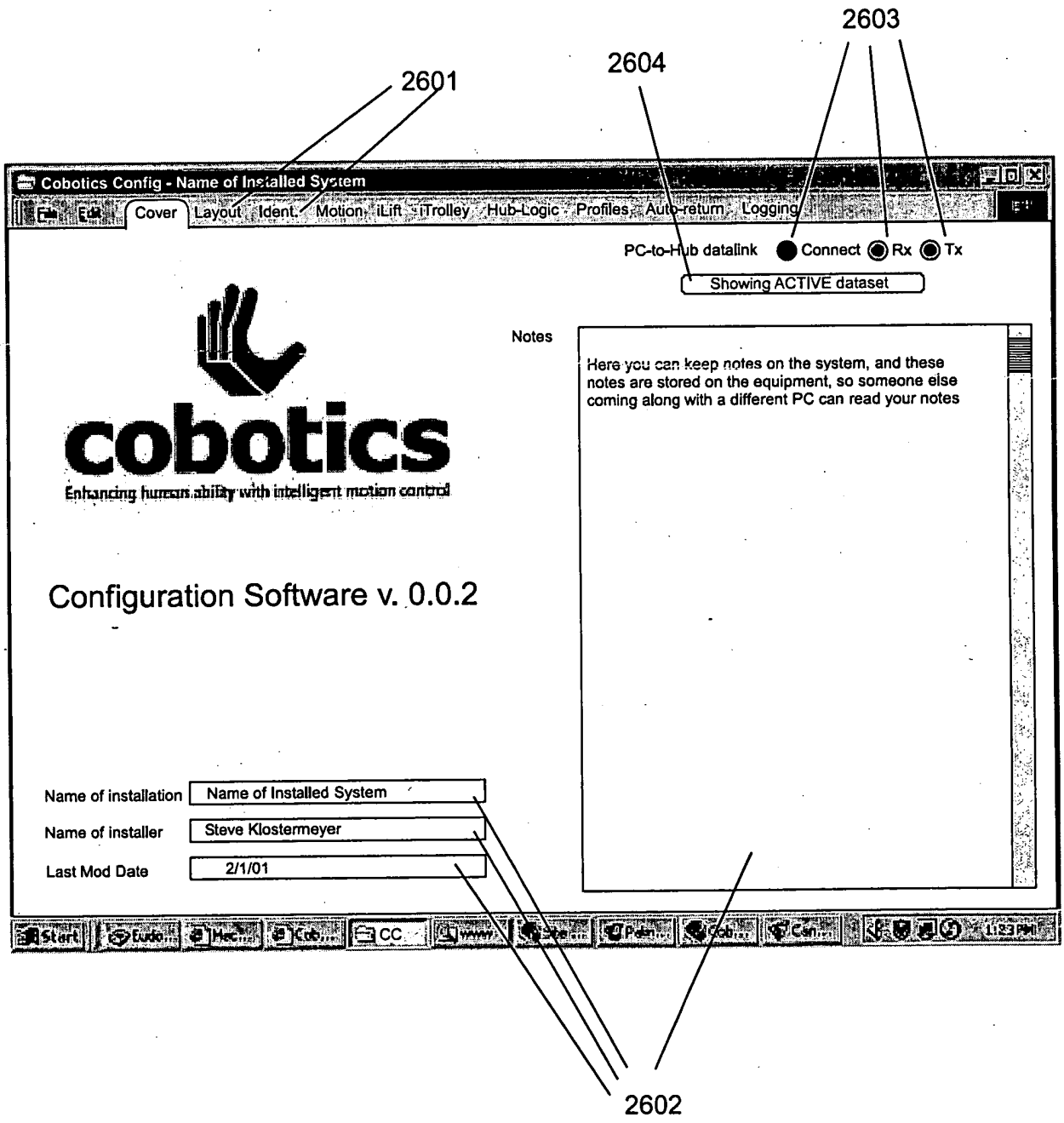
2603
2604
2601
Cobotics Config - Name of Installed System
File
Edit
Cover
Layout
Ident.
Motion
iLift
iTrolley
Hub-Logic
Profiles
Auto-return
Logging
PC-to-Hub datalink
Connect
Rx
Tx
Showing ACTIVE dataset
cobotics
Enhancing human ability with intelligent motion control
Notes
Here you can keep notes on the system, and these notes are stored on the equipment, so someone else coming along with a different PC can read your notes
Configuration Software v. 0.0.2
Name of installation
Name of Installed System
Name of installer
Steve Klostermeyer
Last Mod Date
2/1/01
Start
1:23 PM
2602

Figure 27

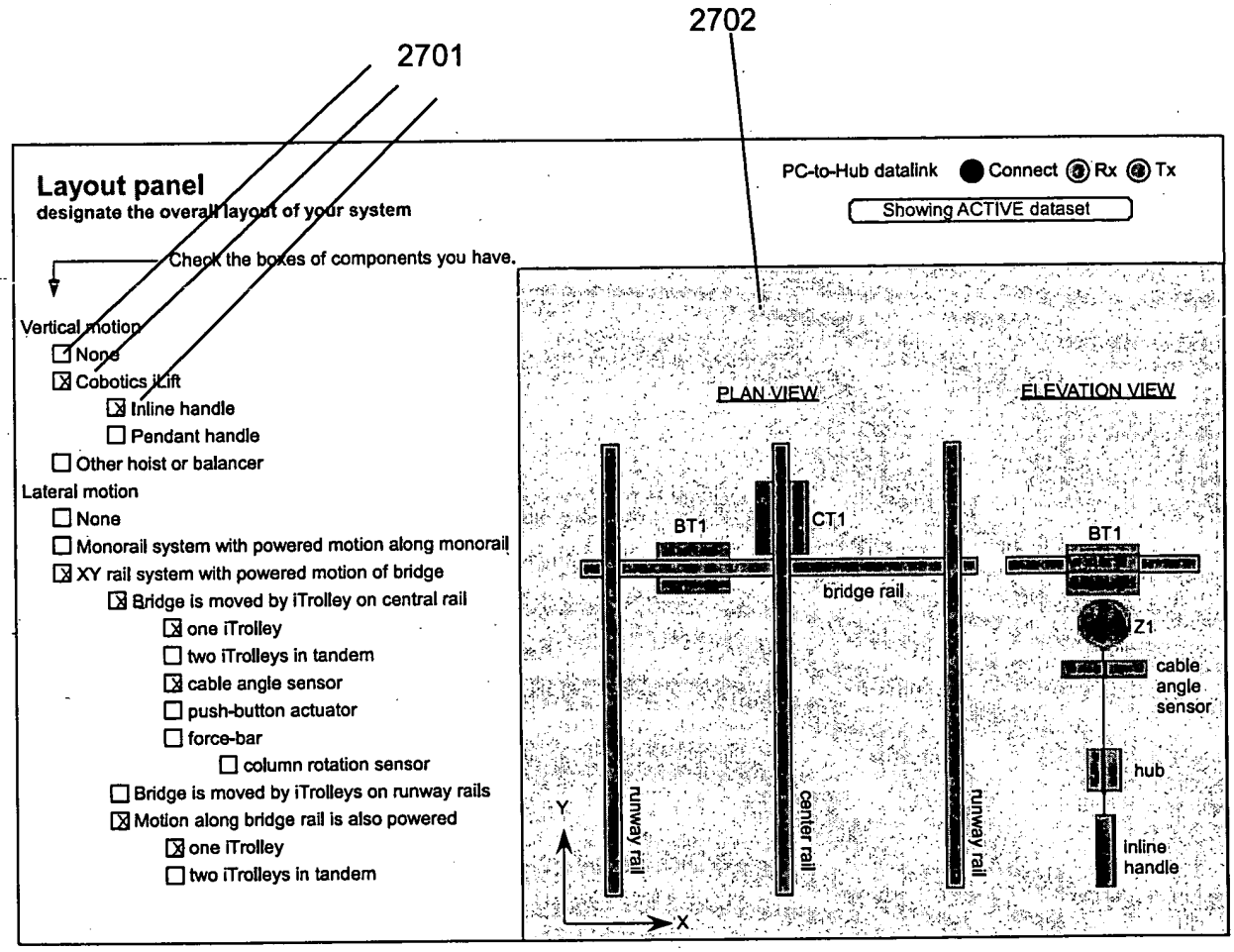
2702
2701
Layout panel
designate the overall layout of your system
Check the boxes of components you have.
PC-to-Hub datalink
Connect
Rx
Tx
Showing ACTIVE dataset
Vertical motion
None
Cobotics iLift
Inline handle
Pendant handle
Other hoist or balancer
Lateral motion
None
Monorail system with powered motion along monorail
XY rail system with powered motion of bridge
Bridge is moved by iTrolley on central rail
one iTrolley
two iTrolleys in tandem
cable angle sensor
push-button actuator
force-bar
column rotation sensor
Bridge is moved by iTrolleys on runway rails
Motion along bridge rail is also powered
one iTrolley
two iTrolleys in tandem
PLAN VIEW
ELEVATION VIEW
BT1
CT1
BT1
bridge rail
Z1
cable angle sensor
hub
inline handle
runway rail
center rail
runway rail
Y
X

Figure 28

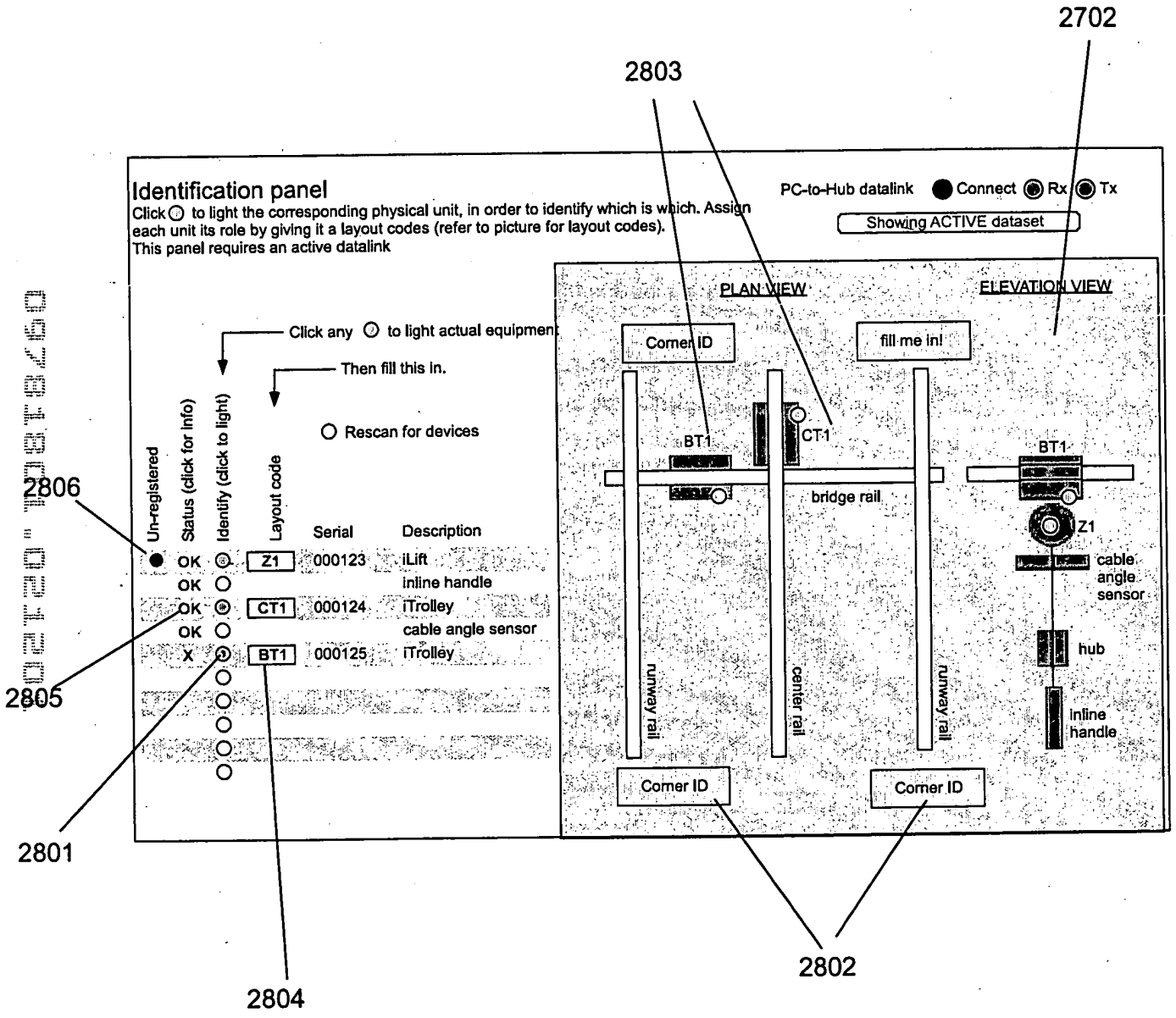
2702
2803
Identification panel
Click ⓘ to light the corresponding physical unit, in order to identify which is which. Assign each unit its role by giving it a layout codes (refer to picture for layout codes).
This panel requires an active datalink
PC-to-Hub datalink
Connect
Rx
Tx
Showing ACTIVE dataset
Click any ⓘ to light actual equipment
Then fill this in.
Rescan for devices
Un-registered
Status (click for info)
Identify (click to light)
Layout code
Serial
Description
OK
Z1
000123
iLift
inline handle
OK
CT1
000124
iTrolley
cable angle sensor
OK
X
BT1
000125
iTrolley
PLAN VIEW
ELEVATION VIEW
Corner ID
fill me in!
BT1
CT1
bridge rail
runway rail
center rail
runway rail
Corner ID
Corner ID
BT1
Z1
cable angle sensor
hub
inline handle
2806
2805
2801
2804
2802

Figure 29

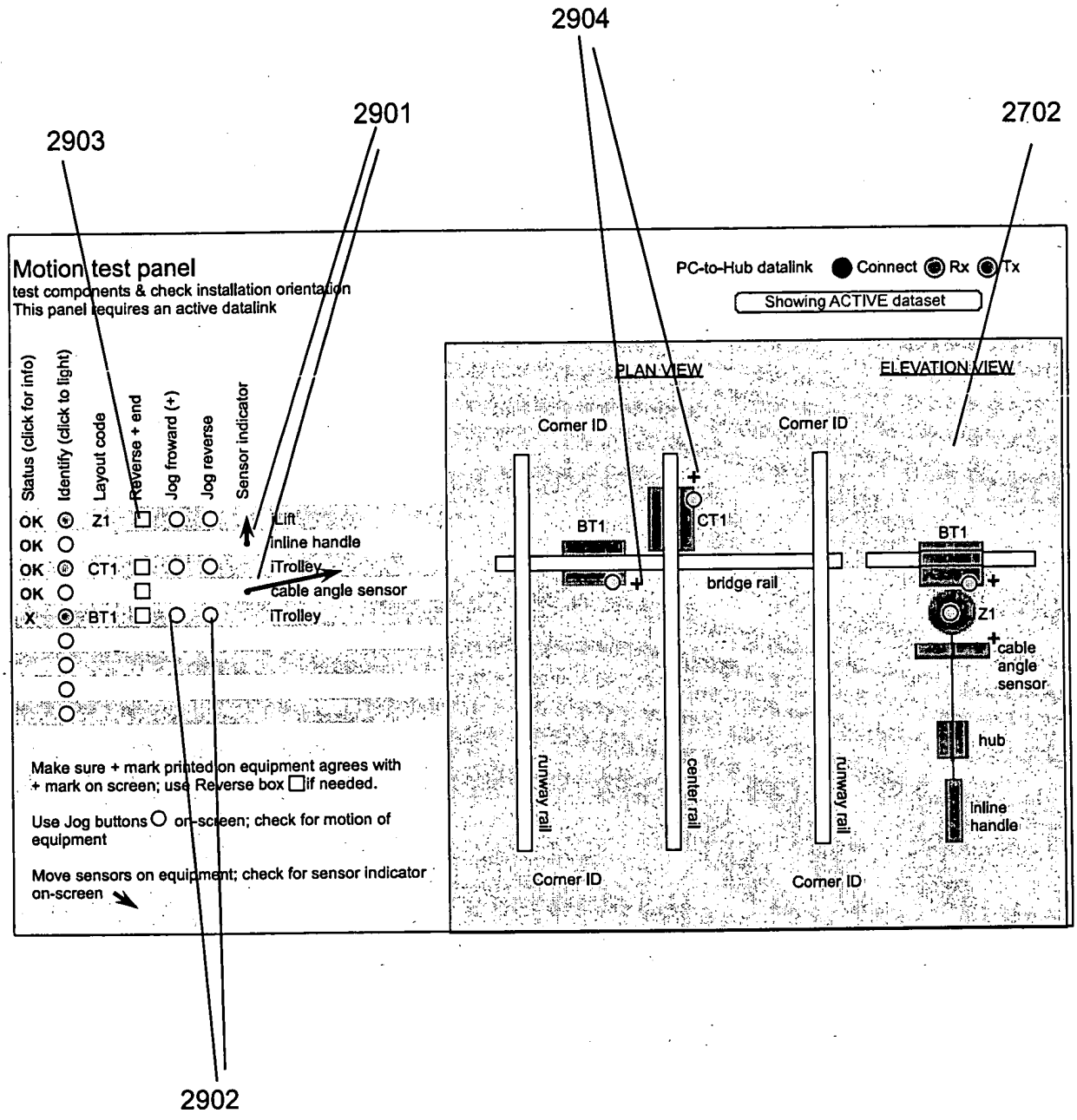
2904
2901
2702
2903
Motion test panel
test components & check installation orientation
This panel requires an active datalink
PC-to-Hub datalink
Connect
Rx
Tx
Showing ACTIVE dataset
Status (click for info)
Identify (click to light)
Layout code
Reverse + end
Jog froward (+)
Jog reverse
Sensor indicator
OK
Z1
Lift
inline handle
CT1
iTrolley
cable angle sensor
BT1
iTrolley
Make sure + mark printed on equipment agrees with + mark on screen; use Reverse box if needed.
Use Jog buttons on-screen; check for motion of equipment
Move sensors on equipment; check for sensor indicator on-screen
PLAN VIEW
ELEVATION VIEW
Corner ID
Corner ID
BT1
CT1
bridge rail
runway rail
center rail
runway rail
Corner ID
Corner ID
BT1
Z1
cable angle sensor
hub
inline handle
2902

Figure 30

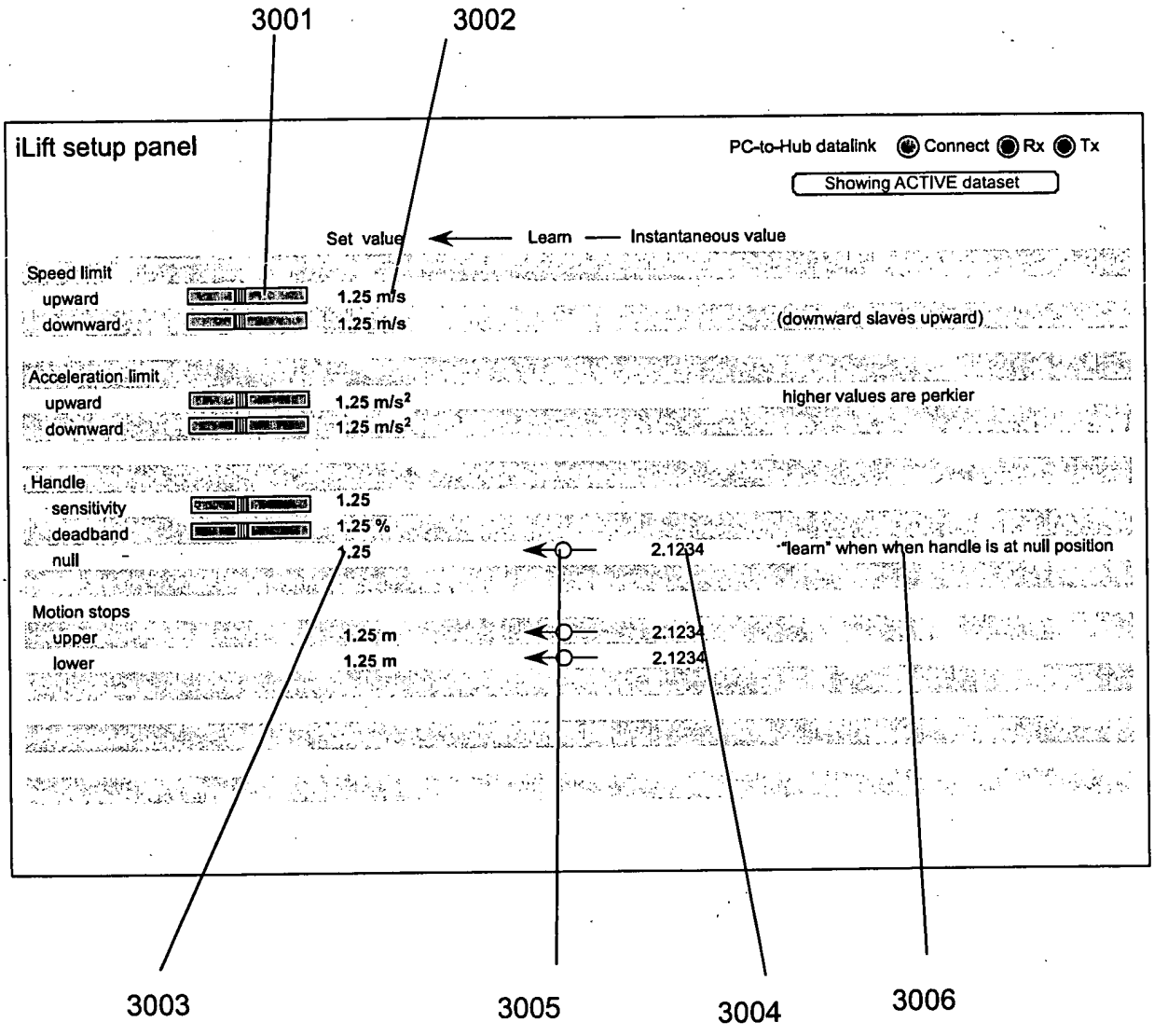
3001
3002
iLift setup panel
PC-to-Hub datalink
Connect
Rx
Tx
Showing ACTIVE dataset
Set value
Learn
Instantaneous value
Speed limit
upward
1.25 m/s
downward
1.25 m/s
(downward slaves upward)
Acceleration limit
upward
1.25 m/s²
downward
1.25 m/s²
higher values are perkier
Handle
sensitivity
1.25
deadband
1.25 %
null
1.25
2.1234
"learn" when when handle is at null position
Motion stops
upper
1.25 m
2.1234
lower
1.25 m
2.1234
3003
3005
3004
3006

Figure 31

3100 {

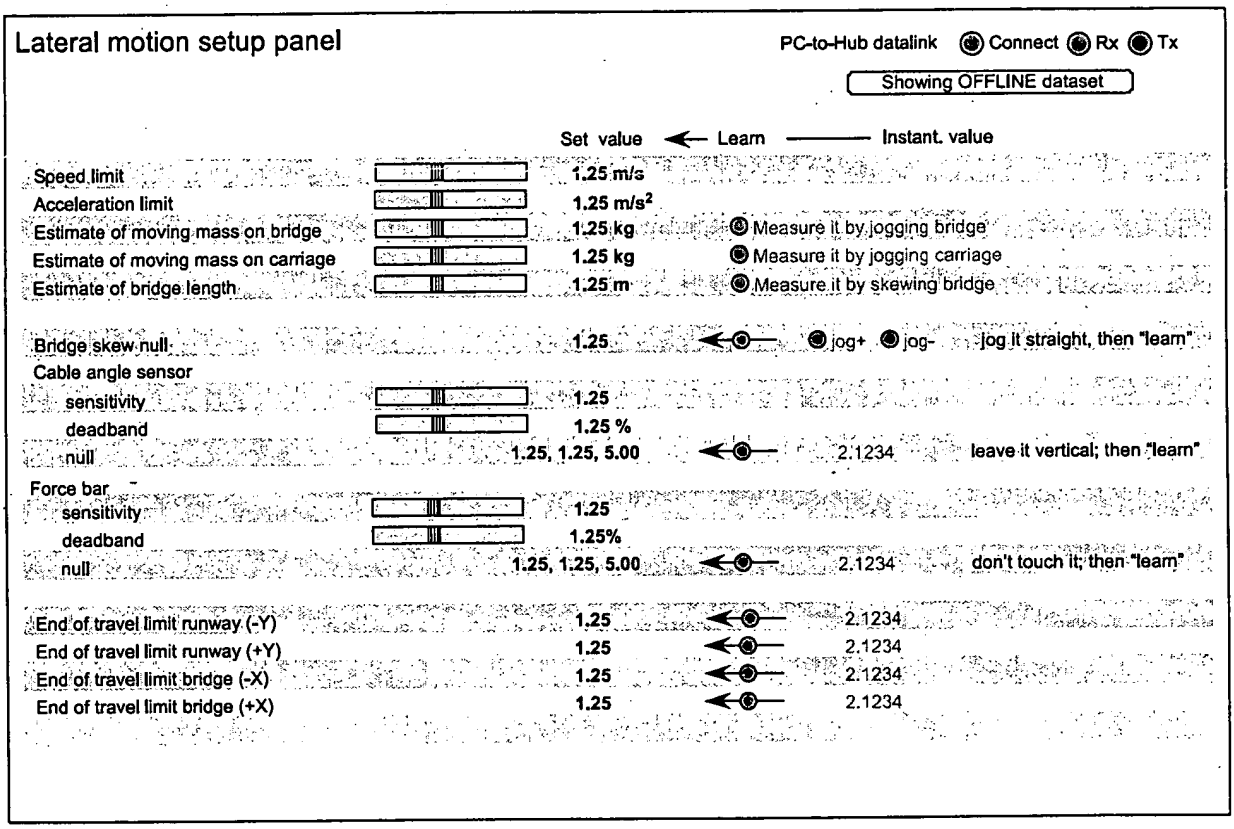

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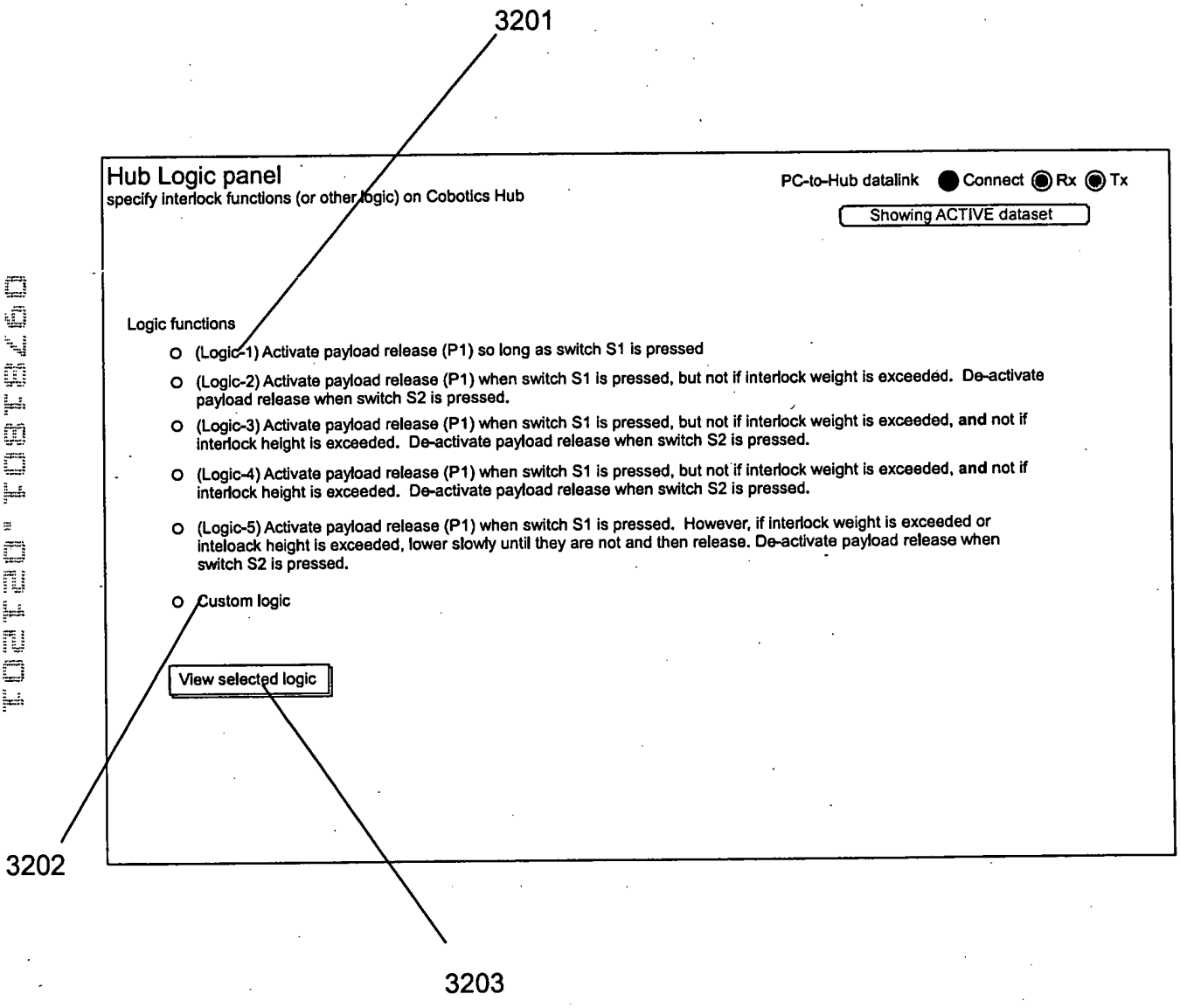
Figure 32



Patent Application Publication

Figure 33

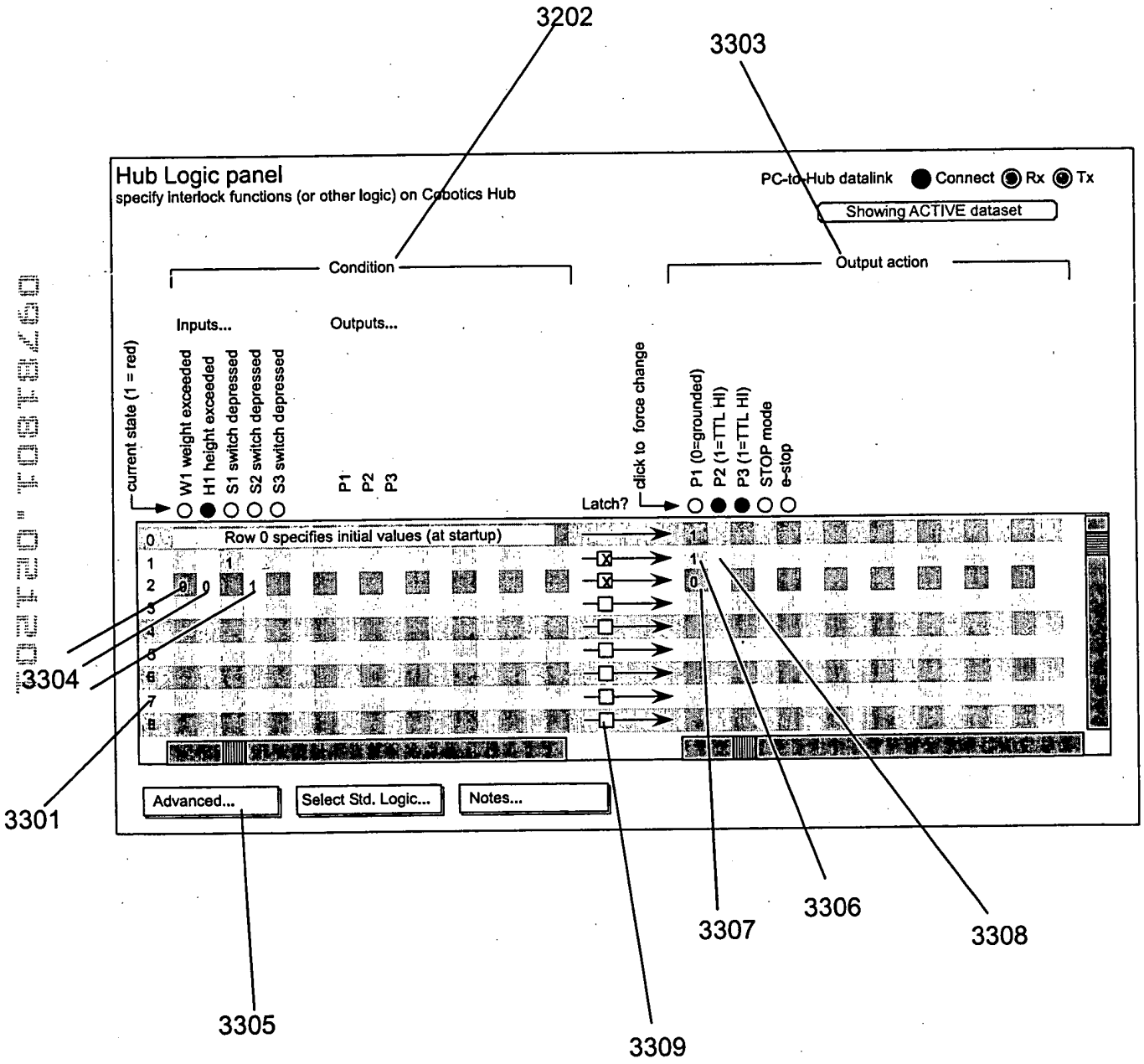
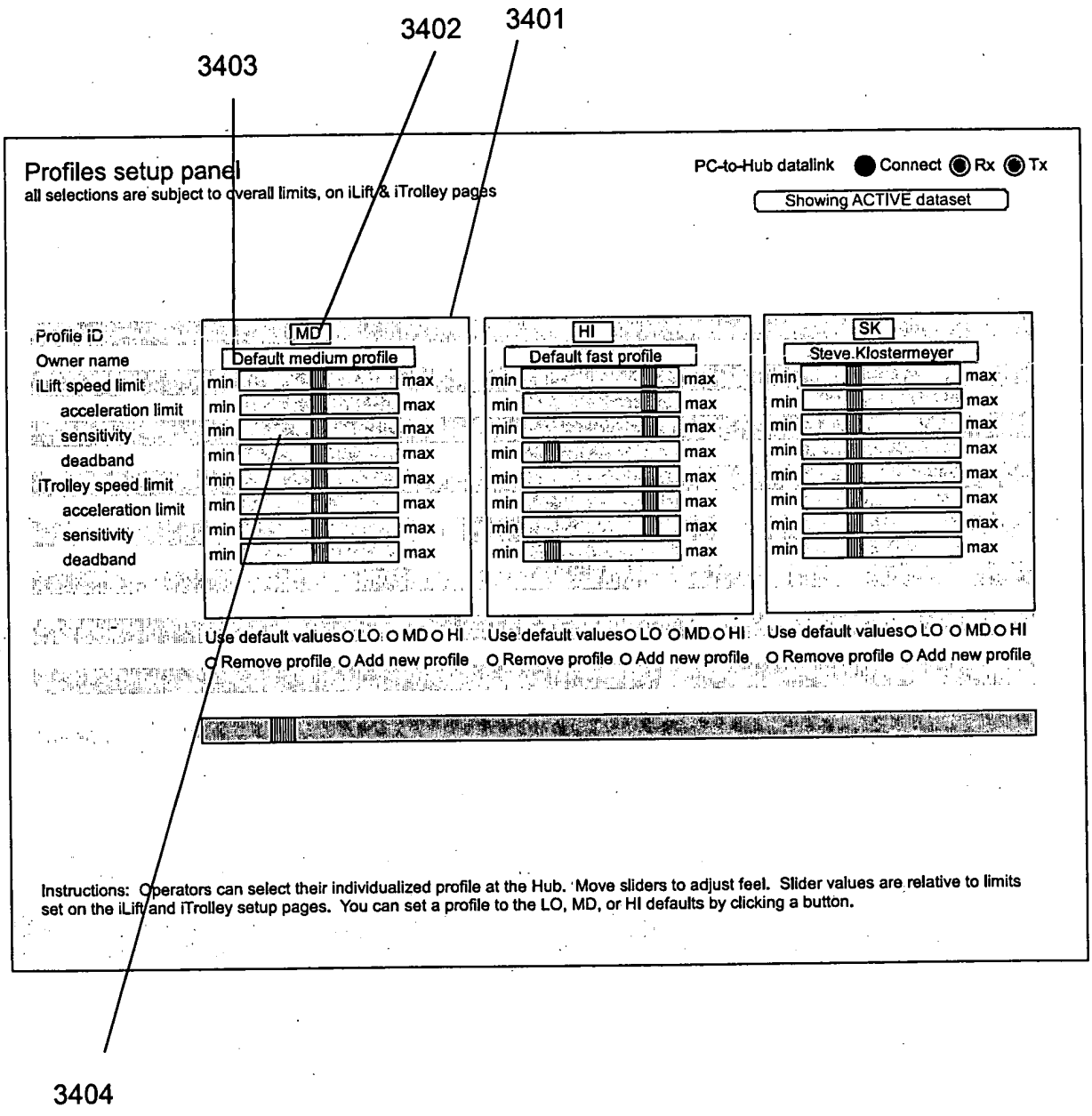

3202
3303
Hub Logic panel
specify interlock functions (or other logic) on Cobotics Hub
PC-to-Hub datalink
Connect
Rx
Tx
Showing ACTIVE dataset
Condition
Output action
Inputs...
Outputs...
current state (1 = red)
W1 weight exceeded
H1 height exceeded
S1 switch depressed
S2 switch depressed
S3 switch depressed
P1
P2
P3
click to force change
Latch?
P1 (0=grounded)
P2 (1=TTL HI)
P3 (1=TTL HI)
STOP mode
e-stop
Row 0 specifies initial values (at startup)
Advanced...
Select Std. Logic...
Notes...
3304
3301
3305
3309
3307
3306
3308

Figure 34



Patent Pending

T02T20 T08T8260

Figure 35

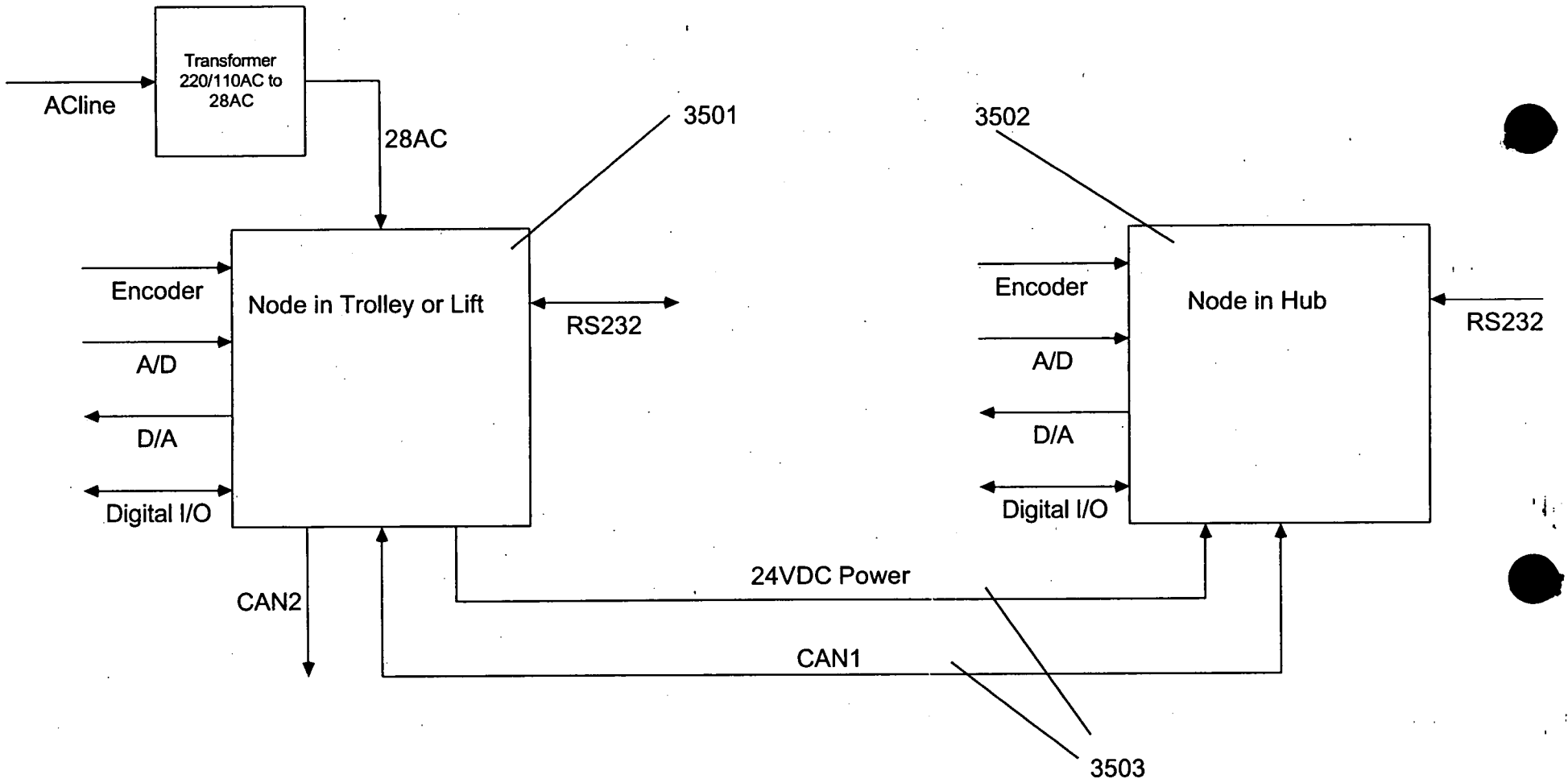


Figure 36

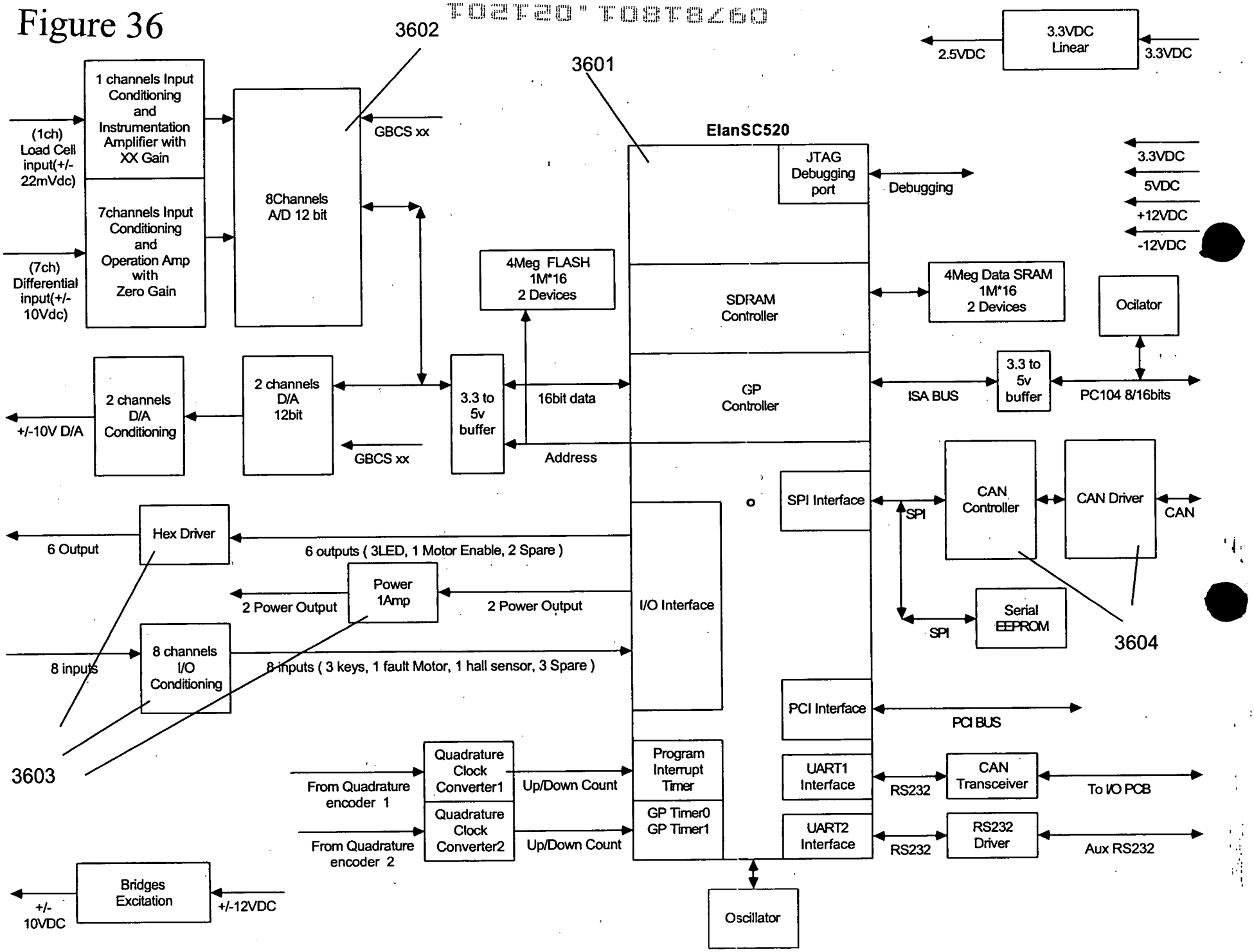

3602
3601
3.3VDC Linear
2.5VDC
3.3VDC
1 channels Input Conditioning and Instrumentation Amplifier with XX Gain
(1ch) Load Cell input(+/- 22mVdc)
7channels Input Conditioning and Operation Amp with Zero Gain
(7ch) Differential input(+/- 10Vdc)
8Channels A/D 12 bit
GBCS xx
ElanSC520
JTAG Debugging port
Debugging
3.3VDC
5VDC
+12VDC
-12VDC
4Meg FLASH 1M*16 2 Devices
SDRAM Controller
4Meg Data SRAM 1M*16 2 Devices
Ocilator
2 channels D/A Conditioning
+/-10V D/A
2 channels D/A 12bit
3.3 to 5v buffer
16bit data
GP Controller
ISA BUS
3.3 to 5v buffer
PC104 8/16bits
GBCS xx
Address
SPI Interface
SPI
CAN Controller
CAN Driver
CAN
Hex Driver
6 Output
6 outputs (3LED, 1 Motor Enable, 2 Spare)
Power 1Amp
2 Power Output
2 Power Output
I/O Interface
Serial EEPROM
SPI
3604
8 channels I/O Conditioning
8 inputs
8 inputs (3 keys, 1 fault Motor, 1 hall sensor, 3 Spare)
PCI Interface
PCI BUS
3603
Quadrature Clock Converter1
From Quadrature encoder 1
Up/Down Count
Program Interrupt Timer
UART1 Interface
RS232
CAN Transceiver
To I/O PCB
Quadrature Clock Converter2
From Quadrature encoder 2
Up/Down Count
GP Timer0
GP Timer1
UART2 Interface
RS232
RS232 Driver
Aux RS232
Bridges Excitation
+/- 10VDC
+/-12VDC
Oscillator

Figure 37

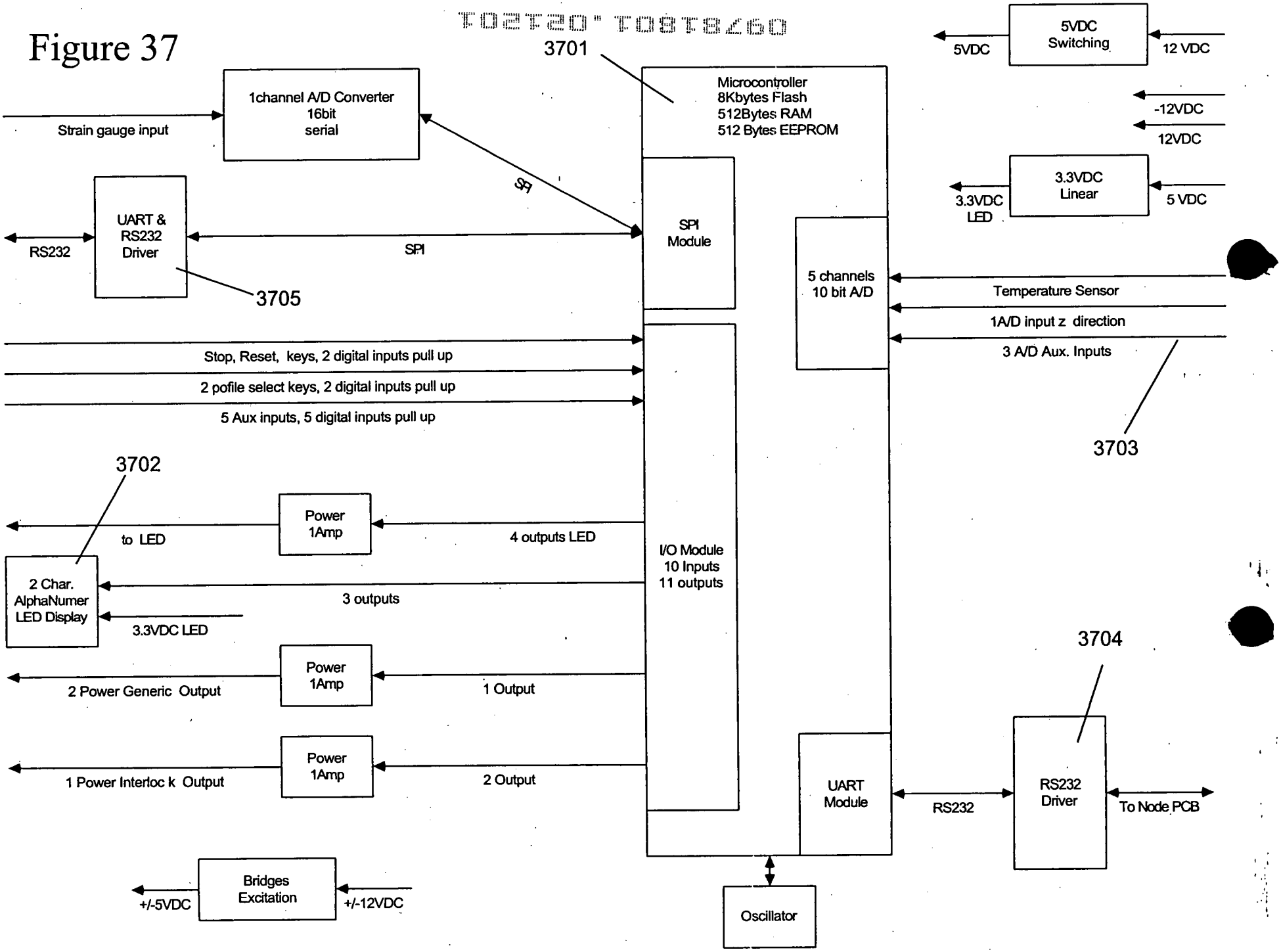

3701
Microcontroller
8Kbytes Flash
512Bytes RAM
512 Bytes EEPROM
1channel A/D Converter
16bit
serial
Strain gauge input
SPI
UART &
RS232
Driver
RS232
SPI
3705
SPI
Module
5VDC
Switching
5VDC
12 VDC
-12VDC
12VDC
3.3VDC
Linear
3.3VDC
LED
5 VDC
5 channels
10 bit A/D
Temperature Sensor
1A/D input z direction
3 A/D Aux. Inputs
3703
Stop, Reset, keys, 2 digital inputs pull up
2 pofile select keys, 2 digital inputs pull up
5 Aux inputs, 5 digital inputs pull up
3702
Power
1Amp
to LED
4 outputs LED
2 Char.
AlphaNumer
LED Display
3 outputs
3.3VDC LED
I/O Module
10 Inputs
11 outputs
Power
1Amp
2 Power Generic Output
1 Output
Power
1Amp
1 Power Interloc k Output
2 Output
3704
UART
Module
RS232
RS232
Driver
To Node PCB
Bridges
Excitation
+/-5VDC
+/-12VDC
Oscillator

Figure 38

Field	Size (bytes)	Data Format	Description
SIZE	1	binary	Packet size.
DEVICE_ID	1	binary	Destination device ID.
CMD_TYPE	1	binary	Command type.
DATA	Variable	binary	Actual data associated with the CMD_TYPE field.
CHKSUM	1	binary	Checksum of the packet. This byte equals to the two's complement of the sum of the SIZE, DEVICE_ID, TYPE and DATA, omitting any carry.

7,058,760